

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Aquatic
Resources Honolulu, Hawaii
96813

June 25, 2021

Board of Land
and Natural Resources
Honolulu, Hawaii

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National Monument
Research Permit to Dr. Andrea Kimiko Kealoha, University of Hawaii Maui College, Water Quality
Lab, for Access to State Waters to Conduct Research Activities on the Biogeochemical and
Oceanographic Processes Associated with the Cryptogenic Alga *Chondria tumulosa* in the
Northwestern Hawaiian Islands

The Division of Aquatic Resources (DAR) hereby submits a request for your authorization and approval for issuance of a Papahānaumokuākea Marine National Monument Research Permit to Dr. Andrea Kimiko Kealoha, University of Hawaii Maui College, Water Quality Lab, pursuant to §187 A-6, Hawai 'i Revised Statutes (HRS), Chapter 13-60.5, Hawai 'i Administrative Rules (HAR), and all other applicable laws and regulations.

The Research Permit, as described below, would allow entry and activities to occur in Papahānaumokuākea Marine National Monument, including the NWHI State Marine Refuge and the waters (0-3 nautical miles) surrounding the following sites:

- Nihoa Island
- Necker Island (Mokumanamana)
- French Frigate Shoals
- Gardner Pinnacles
- Laysan Island
- Lisianski Island
- Pearl and Hermes Atoll
- Midway Atoll
- Kure Atoll
- Maro Reef

The activities covered under this permit would be authorized to occur between July 2021 and June 2022.

BLNR-ITEM F-1

INTENDED ACTIVITIES

Dr. Andrea Kimiko Kealoha of University of Hawaii, Maui College, proposes to collect water and coral tissue samples for the purposes of collecting oceanographic data that will provide insight into the factors that contribute to the presence and distribution of *Chondria tumulosa* (“Chondria”) at Pearl and Hermes Atoll (PHA). These data will increase understanding for biogeochemical and oceanographic processes that may explain the presence and proliferation of Chondria, enable mapping and prediction of further alga spread across the Hawaiian Archipelago, and assist in the development of a tool for identification of areas for targeted management and increased monitoring of potential outbreaks.

This research expedition is part of a larger ONMS cruise (covered under PMNM-2021-001 Co-Trustee Managers Permit and associated memo to file), and will be complimentary to both ONMS research activities and an additional research activity to be conducted on the same cruise under PMNM-2021-019, which will collect macroalgal, invertebrate, and water samples to study the ecology, physiology, and diversity of benthic organisms impacted or potentially impacted by Chondria, as well as Chondria itself in the Northwestern Hawaiian Islands.

Pearl and Hermes Atoll Biosecurity Measures and BMP

All researchers will adhere to the Pearl and Hermes Atoll Biosecurity Measures that were drafted (see attachment) to outline the mitigation steps ONMS cruise participants will follow to ensure adequate biosecurity measures are followed to mitigate the risk associated with accessing Manawai (Pearl and Hermes Atoll or “PHA”) for research activities defined in permits: PMNM-2021-001 Co-Trustee Managers Permit (and associated memo to file), PMNM-2021-016 and PMNM-2021-019. These additional biosecurity measures were drafted to address research projects and activities involving *Chondria tumulosa* which fall outside of BMP 011 (Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment, Papahānaumokuākea Marine National Monument) and the currently existing (or most recent version) draft BMP for PHA in BMP 011 (section D. Protocols For Conducting Operations at Pearl and Hermes Atoll).

In 2016, NOAA observed a new species of mat-forming red alga at Pearl and Hermes Atoll (PHA). By 2019, the alga was widespread and documented from 1 to 19 m depth on the north, west and east sides. The alga exhibits invasive qualities and the mats overgrow and smother corals and macroalgae, causing mortality. Given its rapid increase in areal coverage, this alga has the potential to significantly alter the PHA ecological structure, as well as the ecology at other islands and atolls within the Hawaiian Archipelago if the alga spreads. However, since this is a new species of alga, little is known about its origin, ecology or growth conditions.

The purpose of the proposed activities is to collect oceanographic data that will provide insight into the factors that contribute to the presence and distribution of *Chondria* at PHA. These data will increase understanding for biogeochemical and oceanographic processes that may explain the presence and proliferation of *Chondria*, enable mapping and prediction of further alga spread across the Hawaiian Archipelago, and assist in the development of a tool for identification of areas for targeted management and increased monitoring of potential outbreaks.

Research and Sampling

The following types of research and sampling will occur at the following collection locations: Most collections will occur on Manawai (Pearl and Hermes Atoll) primarily, but other locations may include

Nihoa, Necker, FFS, Garner, Lisianski, Laysan, Midway, Maro Reef and Kure Atoll.

To conduct the studies, the researchers will 1) collect 135 water samples (~60 ml) for dissolved inorganic nutrients, 2) collect 135 water samples (~500 ml) for carbonate chemistry analysis, 3) collect 50 samples for *chl a* analysis, 4) collect 60 samples of coral tissue for stable isotope analysis and 5) perform CTD casts for temperature and salinity depth profiles.

The researchers do not expect CTD casts and water sample collection to impact monument resources or ecological integrity. The researchers will be collecting coral tissue samples for stable isotope analysis, and will limit the number of samples to 60 at most. Coral fragments (2-3 cm²) will be taken as a small subsample of the colony, leaving the remainder of the colony intact. Collection will be done by carefully removing an upward portion coral fragment using hammer and chisel. Apical regions of corals are sites of active growth and therefore recover quickly relative to other areas of the coral. Species types and locations will be chosen to accompany the algal team collection, which means that the researcher's collections will be limited to only those needed to fulfill the goal of the researcher's grant. Collection equipment will be inspected and disinfected between sampling areas to mitigate the spread of invasive species. Best efforts will be made to ensure that sample collection does not disturb marine life or resources in the surrounding environment.

The researchers will collect a small subsample of the coral colony in order to limit disturbance. The information this research provides will far outweigh the disturbance associated with coral collection since managers will be more informed to respond to the current alga outbreak that is decimating the coral reef ecosystem, as well as potential future outbreaks across the archipelago.

The management implications and value of this research far outweighs the adverse impact on Monument resources and ecological integrity. The PHA ecosystem has been devastated by the *Chondria* outbreak, and the other islands/atolls of the Hawaiian Archipelago may already be affected as well. The information generated by the requested activities will help scientists and managers better understand the oceanographic conditions under which this alga grows, and may help to predict and/or prevent the spread of *Chondria* within the Monument and across the Hawaiian Archipelago.

The fieldwork component of this research will be performed under the minimal time required to achieve the goal and objectives of the grant. Collaborators on the grant (but under a separate permit request) will be on the same research cruise. These scientists possess extensive information on algal distribution collected during previous cruises and the researchers will use that data to refine coral and alga collection locations. Water sampling and CTD casts will be conducted efficiently to maximize spatial resolution and minimize activity duration. Prior to the research cruise the researchers are completing a comprehensive oceanographic analysis on all available data, and that will help to inform the water sampling plan as well.

The methods the researchers will use in this study have been used previously throughout the NWHI and at other locations by Dr. Kealoha and other scientists. In the current project, the researchers will use a compact CTD and single niskin for chemistry profiles. This will be less intrusive than the large shipboard rosette and niskin bottles typically used. The data generated by profiling will provide information on the oceanography of PHA, including the depth structure of various parameters, physical and biogeochemical processes, and long-term trends.

Stable isotopes provide useful information about sources of nutrients, biogeochemical cycling and trophic structure within an ecosystem. The researchers will collect coral tissue samples for $\delta^{13}\text{C}$ and

$\delta^{15}\text{N}$ to understand nutritional input from allocthonous sources. For example, studies suggest that corals acquire more energy through heterotrophy when particulate nutrients are available (e.g., during upwelling). This increased heterotrophy would be reflected in the isotopic signature of coral tissue samples. Thus, by collecting coral tissue samples from multiple locations around the atoll, the researchers may be able to identify specific locations for increased inputs of particulate nutrients.

These data also compliment and will be compared to the algae stable isotope data collected by Dr Heather Spalding under PMNM 2021-019. To ensure robustness of the data, species of corals that are known to enhance heterotrophic behavior during periods of increased organic matter input will be collected (e.g., *Pocillopora* and *Montipora*).

Procedures/Methods - Researchers will utilize the following procedures/methods:

1) Conductivity, Temperature and Depth (CTD) casts: Casts will be conducted using a Castaway CTD by Sontek, which is a hand-held CTD designed for coastal profiling to depths of 100 m. Sensors include pressure, temperature and salinity, and the CTD is equipped with a GPS. The researchers will perform casts around the atoll (east, west, north and south) and at multiple locations down to ~ 100 m.

2) Water sampling: With each CTD cast, the researchers will also lower a 2.5 L niskin by hand. The niskin will be tripped at 1 m, and 5 m at select locations. From each 2.5 L cast the researchers will collect water samples for dissolved inorganic nutrients (60 ml), total alkalinity and dissolved inorganic carbon (500 ml) and chl *a* (120 ml).

3) Coral tissue: Coral fragment samples will be collected near the locations that alga samples are collected. Those locations are TBD. The researchers will collect several species of scleractinian corals, with the majority being *Pocillopora* spp. (or *Montipora* spp. as an alternative choice) if available since these are known to exhibit heterotrophic feeding. Coral fragments will be 2-3 cm² in size and collected from the upper portion of the coral using hammer and chisel. No more than sixty (60) fragments will be collected at PHA and no more than thirty (30) fragments at other locations. Fragments will be placed in whirl paks with seawater, and on ice until the boat returns to the wetlab on the ship.

4) Sample processing: TA/DIC- Immediately after water collection into bottles, samples are preserved with 100 μ l mercuric chloride to prevent further biological processes. The cap is sealed with Apeizon grease to prevent air-sea gas exchange. Chl *a*- Filter 120 ml seawater using 10% HCl pre-rinsed syringe and combusted 25 mm GFF filters (pore size 0.2 or 0.7). Wrap filters in foil and store on ice until they can be frozen on the ship at -20°C.

Nutrients- Stored on ice until they can be frozen on the ship at -20°C

Coral tissue- Once on the ship, coral fragments will be airbrushed to remove tissue and stored in Falcon tubes in a -80°C freezer.

Disposition of Organisms

Upon completion of analysis, coral skeletons may be returned to PMNM under the guidance of the cultural working group. Coral fragments may also be made available to other scientists upon approval from PMNM. All samples will be transported back to Honolulu on the marine vessel, then will be shipped back to UH Maui College, Texas A&M University, or delivered to UH Manoa for analysis.

The results of this analysis will be made publicly available, and provided to PMNM. Additionally, the

researchers are collaborating with NOAA partners to learn about sites that have been sampled in the past, which will help to inform sampling in this work and minimize duplicate locations. The researchers are collaborating with Dr. Chris Wall to analyze his coral tissue samples from PMNM, which were collected in 2015. These samples will minimize collection at atolls other than PHR, and will also provide a baseline of isotopic data from coral tissues prior to the *Chondria* outbreak.

MMB Agency Reviewer Questions and Applicant Responses:

1. Please be aware working around Pearl and Hermes will require special conditions attached to your permit. Our team is in the process of finalizing a BMP on this subject. Should also make all efforts to have Pearl and Hermes the last stop and that small boats used to transport to P&H are not be used at any other location in the monument. Jonathon Martinez will be the POC for these measure and can reach out to him for any questions (but please cc me, Phillip Howard).

a. We will follow all guidelines and recommendations for BMP within the monument. We are currently in the process of discussing cruise logistics with PMNM staff.

2. Can you provide clarification on if the proposal is to have single dedicated trip out and back to P&H or will P&H be the last stop on the trip after visiting other locations?

a. We are currently in the process of discussing logistics for two cruises with PMNM staff. Right now, it looks as though this proposal will be on a July cruise dedicated to Manawai, although we may stop at Lalo on the way up.

3. Recommend sterilization of water samples as soon as possible and that water storage vessels be treated carefully to prevent potential leaks from the containers. Consider secondary containment. Recommend not returning coral fragments from P&H to the monument after the project is done. Jonathon Martinez will be the POC for these measure and can reach out to him or any questions (but please cc me, Phillip Howard).

a. Ok. We will communicate and coordinate with Jonathon Martinez related to these measures.

4. Kalani Quioko is "wondering if there are any outreach and education opportunities through Dr. Kealoha at UH Maui College. Always looking for PMNM opportunities on neighbor islands too. Can't wait for Hāna Limu Festival again!"

a. I would love our students to have more opportunities to learn about PMNM and marine science in general! Feel free to email me and we can talk story! andreake@hawaii.edu

5. Will be recommending the following as a special condition of the permit: "Permittee will implement collection/sampling design that removes a sustainable proportion from the local population of target organisms and make efforts to distribute collection activities across shoreline/reef flat/benthic areas, so as not to consolidate the impacts of collection in one location (if applicable/if collecting samples)."

a. Ok. The purpose of collecting coral tissue samples is to understand oceanographic and nutrient dynamics in areas of both high and low *Chondria* cover. Therefore, we will distribute collection activities atoll-wide.

6. Is it possible for the researcher to collect fragments from colonies which are less than 1 m in diameter, in order to reduce potential impacts to older coral colonies?

a. We will be collecting coral tissue samples near the algae collections. The sampler can target collections from colonies less than 1 m in diameter. This is now included in the permit request.

7. Is this possible for the research objective or are samples from colonies greater than 1 m in diameter necessary in order to collect certain data? If so, can researcher provide reasoning for sampling coral colonies greater than 1 m in diameter, and what proportion of the total sample size needs to be collected from colonies greater than 1 m in diameter?

a. I cannot think of any reason why we would need to specifically collect from colonies greater than 1 m. Therefore, the sampler will try to identify coral collection from colonies less than 1 m in diameter.

8. NMFS request that the applicant contact the Hawaiian Monk Seal Research Program (Michelle Barbieri at Michelle.Barbieri@noaa.gov) and Marine Turtle Biology and Assessment Program (Yonat Swimmer at Yonat.Swimmer@noaa.gov, and Summer Martin at Summer.Martin@noaa.gov) to discuss communications/expectations for COVID safety in the field as teams may be deployed in the same place and time as the applicant.

a. Ok, we will coordinate this with other scientists on the cruise as well.

9. A maximum of 60 coral samples at 2-3cm² size is not a major concern. However there should be a minimum size requirement for a colony in order for it to be sampled. Ex: the sample size should be no more than X% (10, 25, etc.) of the total colony size. Could you detail methods that would codify this requirement, for us to review?

a. I am not aware of a specific method or SOP that details coral collection to minimize impact in this way. However, we have consulted with Dr. Chris Wall (who has considerable experience with coral tissue sampling including in the NWHI) and he has advised sampling only adult colonies (although see above, targeting less than 1 m diameter) or colonies with at least 6 branch tips. This is now included in the permit application.

10. Are specific coral species being targeted or just Pocillopora? Having samples to compare within a family group may present a better analysis and results.

a. We will target Pocillopora since literature has suggested these corals may exhibit a high degree of heterotrophy. We will also target Montipora. Chris Wall has coral tissue samples of Montipora collected at Manawai (and throughout the NWHI) in 2015 and these samples will serve as a nice before/after Chondria outbreak comparison for the isotope analysis.

11. How close to land will your permitted activities take place across the Monument?

a. Sampling activities will not be conducted near land.

12. Please consider using Hawaiian place and species names wherever feasible on future permits and reports to help in the revitalization and normalization of 'Ōlelo Hawai'i.

a. Ok thank you for this suggestion, and we have revised the current permit application to include this.

13. Following strict biosecurity protocols will be paramount for this activity. Please read and follow all monument BMPs carefully, especially 006 "General Storage and Transport Protocols for Collected Samples", and 011 "Disease and Introduced Species Prevention Protocols".

a. Ok, I will ensure all individuals involved in this permit application read monument BMPs.

14. Considering the elevated biosecurity risk, please be sure to do a thorough step-by-step review of your methods and work plan with a Monument representative who is familiar with marine biosecurity, prior to departing.

a. Ok.

15. Please abide by BMP 004 "Best Management Practices for Boat Operations and Diving Activities" while operating small boats.

a. OK

16. We request that a copy of all publications be sent to Co-Managing agencies, once available.

a. Ok.

17. What does CTD stand for? What is a CTD cast? And what does it entail?" (Mentioned it multiple times but don't explain what it stands for)

a. Thank you for pointing this out. I have revised the permit request to include the following information: To accomplish this activity, we would conduct handheld CTD (conductivity, temperature, depth) casts off the side of a small boat within and around PHA. CTDs allow for depth profiles of both temperature and salinity to provide information about oceanographic conditions below the surface ocean. And this to give an idea of size: Casts will be conducted using a Castaway CTD by Sontek, which is a hand-held CTD (dimensions 7 cm diameter and 20 cm height, 1 lb. weight) designed for coastal profiling to depths of 100 m.

The activities proposed by the applicant directly support the Monument Management Plan's (PMNM MMP Vol. 1, 2008) priority management needs in the Marine Conservation Science action plan (3.1.1). Activities noted as part of these plans include monitoring and characterizing shallow and deep-water habitats:

- MCS-1: Continue and enhance research, characterization, and monitoring of marine ecosystems for the life of the plan, as appropriate.

The activities described above may require the following regulated activities to occur in State waters:

- ☒ Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving monument resource
- ☒ Touching coral, living or dead

☒ Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

The applicant would abide by the following PMNM Best Management Practices (BMPs) while conducting the aforementioned activities within the PMNM: Best Management Practices for Human Hazards to Seabirds (BMP#003); Boat Operations and Diving Activities (BMP #004); General Storage and Transport Protocols for Collected Samples (BMP#006); Special Conditions and Rules for Moving Between Islands/Atolls and Packing for Field Camps (BMP#007); Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles (BMP#009); Marine Wildlife Viewing Guidelines (BMP #010); Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (BMP #011); and Best Management Practices for Maritime Heritage Sites (BMP#017).

REVIEW PROCESS:

The permit application was sent out for review and comment to the following scientific and cultural entities: Hawaii Division of Aquatic Resources, Hawaii Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service Hawaiian and Pacific Islands National Wildlife Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application was posted on the Monument Web site in the spring of 2021, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy

Environmental Compliance:

NEPA / HEPA: (check-one)

- ☒ Categorical Exclusion / Exempt Class: 5
☐ EA
☐ EIS

Other Consultations: (ESA/MMPA Section 7; NHPA Section 106, etc.)

- An informal review of all aforementioned activities following section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. 1855(b)) was completed on 5/11/2021. NMFS-prescribed conditions will be reflected in the PMNM permit, prior to issuance.
- On 5/4/2021, NMFS concurred that all proposed permit activities would be covered under PMNM's programmatic ESA Section 7 informal consultation. NMFS-prescribed conditions will be reflected in the PMNM permit, prior to issuance.
- To mitigate risk of spreading the *Chondria tumulosa* within the monument and main Hawaiian

Islands discussions with subject matter experts occurred. Agreed upon *Chondria* mitigation language will be added into the final permit as special conditions.

The Department has made an exemption determination for this permit in accordance with Chapter 343, HRS, and Chapter 11-200.1, HAR. See Attachment (“DECLARATION OF EXEMPTION FROM THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT UNDER THE AUTHORITY OF CHAPTER 343, HRS AND CHAPTER 11-200.1 HAR, FOR PAPAĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR. ANDREA KIMIKO KEALOHA, UNIVERSITY OF HAWAII MAUI COLLEGE, WATER QUALITY LAB, FOR ACCESS TO STATE WATERS TO CONDUCT RESEARCH ACTIVITIES ON THE BIOGEOCHEMICAL AND OCEANOGRAPHIC PROCESSES ASSOCIATED WITH THE CRYPTOGENIC ALGA *CHONDRIA TUMULOSA* IN THE NORTHWESTERN HAWAIIAN ISLANDS UNDER PERMIT PMNM-2021-016”)

Has Applicant been granted a permit from the State in the past? Yes ☐ No ☒

If so, please summarize past permits:

Have there been any a) violations: Yes ☐ No ☒

b) Late/incomplete post-activity reports: Yes ☐ No ☒

Are there any other relevant concerns from previous permits? Yes ☐ No ☒

STAFF OPINION:

DAR staff is of the opinion that Applicant has properly demonstrated valid justifications for their application and should be allowed to enter the NWHI State waters and to conduct the activities therein as specified in the application with certain special instructions and conditions, which are in addition to the Papahānaumokuākea Marine National Monument Conservation and Management Permit General Conditions. All suggested special conditions have been vetted through the legal counsel of the Co-Trustee agencies (see Recommendation section).

MONUMENT MANAGEMENT BOARD OPINION:

The MMB is of the opinion that the Applicant has met the findings of Presidential Proclamation 8031 and this activity may be conducted subject to completion of all compliance requirements. The MMB concurs with the special conditions recommended by NOAA, USFWS, ONMS, DAR, DOFAW and OHA staff.

RECOMMENDATION:

Based on the attached proposed declaration of exemption prepared by the department after consultation with and advice of those having jurisdiction and expertise for the proposed permit actions:

1. That the Board declare that the actions which are anticipated to be undertaken under this permit will have little or no significant effect on the environment and is therefore exempt from the preparation of an environmental assessment.
2. Upon the finding and adoption of the department's analysis by the Board, that the Board delegate and authorize the Chairperson to sign the declaration of exemption for purposes of recordkeeping requirements of chapter 343, HRS, and chapter 11-200.1, HAR.
3. That the Board authorize and approve a Research Permit to Dr. Andrea Kimiko Kealoha, University of Hawaii Maui College, Water Quality Lab, for Access to State Waters to Conduct Research Activities on the Biogeochemical and Oceanographic Processes Associated with the Cryptogenic Alga *Chondria tumulosa* in the Northwestern Hawaiian Islands, with the following special conditions:
 - a. This permit is not to be used for nor does it authorize the sale of collected organisms. Under this permit, the authorized activities must be for noncommercial purposes not involving the use or sale of any organism, by-products, or materials collected within the Monument for obtaining patent or intellectual property rights.
 - b. The permittee may not convey, transfer, or distribute, in any fashion (including, but not limited to, selling, trading, giving, or loaning) any coral, live rock, or organism collected under this permit without the express written permission of the Co-Trustees.
 - c. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocol attached to this permit.
 - d. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.
 - e. Refueling of tenders and all small vessels must be done at the support ships and outside the confines of lagoons or near-shore waters in the State Marine Refuge.
 - f. No fishing is allowed in State Waters except as authorized under State law for subsistence, traditional and customary practices by Native Hawaiians.
 - g. If there is any Hawaiian monk seal or any other protected species in the area when performing any permitted activity shall cease until the animal(s) depart the area, except as permitted for specific management of that species.
 - h. Permittee will implement collection/sampling design that removes a sustainable proportion from the local population of target organisms and make efforts to distribute collection activities across shoreline/reef flat/benthic areas, so as not to consolidate the impacts of collection in one location (if applicable/if collecting samples).
 - i. Permittee will collect samples of coral from colonies which are less than one (1) meter in diameter (to the extent practicable).
 - j. Permittee will adhere to currently existing Pearl and Hermes protocols for BMP 011 (Disease

And Introduced Species Prevention Protocol For Permitted Activities In The Marine Environment – Section D. Protocols For Conducting Operations at Pearl and Hermes Atoll) or the most recently updated version of this protocol, during all activities conducted at Pearl and Hermes (note: condition language may differ in PMNM permit).

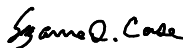
- k. The permittee is required to follow all applicable Federal, State, and County laws with respect to the COVID-19 emergency response that apply at the time of departure and return. In issuance of this permit, the State of Hawaii is not otherwise monitoring or regulating permittee's compliance with COVID-19 laws and is not responsible for the health and safety of crew members, researchers or other occupants of the vessel associated with this permit.

Respectfully submitted,



Brian J. Neilson, Administrator
Division of Aquatic Resources

APPROVED FOR SUBMITTAL

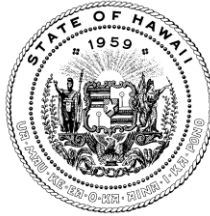


Suzanne D. Case, Chairperson
Board of Land and Natural Resources

Attachments:

- 1) Declaration of Exemption (“DE”) from the Preparation of an Environmental Assessment under the Authority of Chapter 343, HRS & Chapter 11-200.1 HAR
- 2) PMNM Application
- 3) CIS Form
- 4) Additional Pearl and Hermes Atoll Biosecurity Measures (supplemental to existing draft BMPs for PHA in BMP 011: Section D. Protocols For Conducting Operations at Pearl and Hermes Atoll).
- 5) Maps of Sampling Sites

DAVID Y. IGE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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HONOLULU, HAWAII 96809

SUZANNE D. CASE
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BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
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CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

June 25, 2021

TO: Division of Aquatic Resources File

THROUGH: Suzanne D. Case, Chairperson

FROM: Brian J. Neilson, Administrator
Division of Aquatic Resources

A handwritten signature in black ink, appearing to read "B. J. Neilson".

SUBJECT:

DECLARATION OF EXEMPTION FROM THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT UNDER THE AUTHORITY OF CHAPTER 343, HRS AND CHAPTER 11-200.1 HAR, FOR A PAPA HĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR. ANDREA KIMIKO KEALOHA, UNIVERSITY OF HAWAII MAUI COLLEGE, WATER QUALITY LAB, FOR ACCESS TO STATE WATERS TO CONDUCT RESEARCH ACTIVITIES ON THE BIOGEOCHEMICAL AND OCEANOGRAPHIC PROCESSES ASSOCIATED WITH THE CRYPTOGENIC ALGA *CHONDRIA TUMULOSA* IN THE NORTHWESTERN HAWAIIAN ISLANDS UNDER PERMIT PMNM-2021-016.

The following permitted activities are found to be exempted from preparation of an environmental assessment under the authority of Chapter 343, HRS and Chapter 11-200.1, HAR:

Project Title: Papahānaumokuākea Marine National Monument Research Permit to Dr. Andrea Kimiko Kealoha, University of Hawaii Maui College, Water Quality Lab, for Access to State Waters to Conduct Research Activities on the Biogeochemical and Oceanographic Processes Associated with the Cryptogenic Alga *Chondria tumulosa* in the Northwestern Hawaiian Islands.

Permit Number: PMNM-2021-016

Project Description: Dr. Andrea Kimiko Kealoha of University of Hawaii, Maui College, proposes to collect water and coral tissue samples for the purposes of collecting oceanographic data that will provide insight into the factors that contribute to the presence and distribution of *Chondria tumulosa* ("Chondria") at Pearl and Hermes Atoll (PHA). These data will increase understanding for biogeochemical and oceanographic processes that may explain the presence and proliferation of Chondria, enable mapping and prediction of further alga spread across the Hawaiian Archipelago, and assist in the development of a tool for identification of areas for targeted management and increased monitoring of potential outbreaks.

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The activities covered under this permit would be authorized to occur between July 2021 and June 2022.

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This research expedition is part of a larger ONMS cruise (covered under PMNM-2021-001 Co-Trustee Managers Permit and associated memo to file), and will be complimentary to both ONMS research activities and an additional research activity to be conducted on the same cruise under PMNM-2021-019, which will collect macroalgal, invertebrate, and water samples to study the ecology, physiology, and diversity of benthic organisms impacted or potentially impacted by *Chondria*, as well as *Chondria* itself in the Northwestern Hawaiian Islands.

Pearl and Hermes Atoll Biosecurity Measures and BMP

All researchers will adhere to the Pearl and Hermes Atoll Biosecurity Measures that were drafted (see attachment) to outline the mitigation steps ONMS cruise participants will follow to ensure adequate biosecurity measures are followed to mitigate the risk associated with accessing Manawai (Pearl and Hermes Atoll or “PHA”) for research activities defined in permits: PMNM-2021-001 Co-Trustee Managers Permit (and associated memo to file), PMNM-2021-016 and PMNM-2021-019. These additional biosecurity measures were drafted to address research projects and activities involving *Chondria tumulosa* which fall outside of BMP 011 (Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment, Papahānaumokuākea Marine National Monument) and the currently existing (or most recent version) draft BMP for PHA in BMP 011 (section D. Protocols For Conducting Operations at Pearl and Hermes Atoll).

In 2016, NOAA observed a new species of mat-forming red alga at Pearl and Hermes Atoll (PHA). By 2019, the alga was widespread and documented from 1 to 19 m depth on the north, west and east sides. The alga exhibits invasive qualities and the mats overgrow and smother corals and macroalgae, causing mortality. Given its rapid increase in areal coverage, this alga has the potential to significantly alter the PHA ecological structure, as well as the ecology at other islands and atolls within the Hawaiian

Archipelago if the alga spreads. However, since this is a new species of alga, little is known about its origin, ecology or growth conditions.

The purpose of the proposed activities is to collect oceanographic data that will provide insight into the factors that contribute to the presence and distribution of *Chondria* at PHA. These data will increase understanding for biogeochemical and oceanographic processes that may explain the presence and proliferation of *Chondria*, enable mapping and prediction of further alga spread across the Hawaiian Archipelago, and assist in the development of a tool for identification of areas for targeted management and increased monitoring of potential outbreaks.

Research and Sampling

The following types of research and sampling will occur at the following collection locations: Most collections will occur on Manawai (Pearl and Hermes Atoll) primarily, but other locations may include Nihoa, Necker, FFS, Garner, Lisianski, Laysan, Midway, Maro Reef and Kure Atoll.

To conduct the studies, the researchers will 1) collect 135 water samples (~60 ml) for dissolved inorganic nutrients, 2) collect 135 water samples (~500 ml) for carbonate chemistry analysis, 3) collect 50 samples for chl *a* analysis, 4) collect 60 samples of coral tissue for stable isotope analysis and 5) perform CTD casts for temperature and salinity depth profiles.

The researchers do not expect CTD casts and water sample collection to impact monument resources or ecological integrity. The researchers will be collecting coral tissue samples for stable isotope analysis, and will limit the number of samples to 60 at most. Coral fragments (2-3 cm²) will be taken as a small subsample of the colony, leaving the remainder of the colony intact. Collection will be done by carefully removing an upward portion coral fragment using hammer and chisel. Apical regions of corals are sites of active growth and therefore recover quickly relative to other areas of the coral. Species types and locations will be chosen to accompany the algal team collection, which means that the researcher's collections will be limited to only those needed to fulfill the goal of the researcher's grant. Collection equipment will be inspected and disinfected between sampling areas to mitigate the spread of invasive species. Best efforts will be made to ensure that sample collection does not disturb marine life or resources in the surrounding environment.

The researchers will collect a small subsample of the coral colony in order to limit disturbance. The information this research provides will far outweigh the disturbance associated with coral collection since managers will be more informed to respond to the current alga outbreak that is decimating the coral reef ecosystem, as well as potential future outbreaks across the archipelago.

The management implications and value of this research far outweighs the adverse impact on Monument resources and ecological integrity. The PHA ecosystem has been devastated by the *Chondria* outbreak, and the other islands/atolls of the Hawaiian Archipelago may already be affected as well. The information generated by the requested activities will help scientists and managers better understand the oceanographic conditions under which this alga grows, and may help to predict and/or prevent the spread of *Chondria* within the Monument and across the Hawaiian Archipelago.

The fieldwork component of this research will be performed under the minimal time required to achieve the goal and objectives of the grant. Collaborators on the grant (but under a separate permit request) will

be on the same research cruise. These scientists possess extensive information on algal distribution collected during previous cruises and the researchers will use that data to refine coral and alga collection locations. Water sampling and CTD casts will be conducted efficiently to maximize spatial resolution and minimize activity duration. Prior to the research cruise the researchers are completing a comprehensive oceanographic analysis on all available data, and that will help to inform the water sampling plan as well.

The methods the researchers will use in this study have been used previously throughout the NWHI and at other locations by Dr. Kealoha and other scientists. In the current project, the researchers will use a compact CTD and single niskin for chemistry profiles. This will be less intrusive than the large shipboard rosette and niskin bottles typically used. The data generated by profiling will provide information on the oceanography of PHA, including the depth structure of various parameters, physical and biogeochemical processes, and long-term trends.

Stable isotopes provide useful information about sources of nutrients, biogeochemical cycling and trophic structure within an ecosystem. The researchers will collect coral tissue samples for $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ to understand nutritional input from allocthonous sources. For example, studies suggest that corals acquire more energy through heterotrophy when particulate nutrients are available (e.g., during upwelling). This increased heterotrophy would be reflected in the isotopic signature of coral tissue samples. Thus, by collecting coral tissue samples from multiple locations around the atoll, the researchers may be able to identify specific locations for increased inputs of particulate nutrients.

These data also compliment and will be compared to the algae stable isotope data collected by Dr Heather Spalding under PMNM 2021-019. To ensure robustness of the data, species of corals that are known to enhance heterotrophic behavior during periods of increased organic matter input will be collected (e.g., *Pocillopora* and *Montipora*).

Procedures/Methods - Researchers will utilize the following procedures/methods:

1) Conductivity, Temperature and Depth (CTD) casts: Casts will be conducted using a Castaway CTD by Sontek, which is a hand-held CTD designed for coastal profiling to depths of 100 m. Sensors include pressure, temperature and salinity, and the CTD is equipped with a GPS. The researchers will perform casts around the atoll (east, west, north and south) and at multiple locations down to ~ 100 m.

2) Water sampling: With each CTD cast, the researchers will also lower a 2.5 L niskin by hand. The niskin will be tripped at 1 m, and 5 m at select locations. From each 2.5 L cast the researchers will collect water samples for dissolved inorganic nutrients (60 ml), total alkalinity and dissolved inorganic carbon (500 ml) and chl *a* (120 ml).

3) Coral tissue: Coral fragment samples will be collected near the locations that alga samples are collected. Those locations are TBD. The researchers will collect several species of scleractinian corals, with the majority being *Pocillopora* spp. (or *Montipora* spp. as an alternative choice) if available since these are known to exhibit heterotrophic feeding. Coral fragments will be 2-3 cm² in size and collected from the upper portion of the coral using hammer and chisel. No more than sixty (60) fragments will be collected at PHA and no more than thirty (30) fragments at other locations. Fragments will be placed in whirl paks with seawater, and on ice until the boat returns to the wetlab on the ship.

4) Sample processing: TA/DIC- Immediately after water collection into bottles, samples are preserved with 100µl mercuric chloride to prevent further biological processes. The cap is sealed with Apeizon grease to prevent air-sea gas exchange. Chl *a*- Filter 120 ml seawater using 10% HCl pre-rinsed syringe and combusted 25 mm GFF filters (pore size 0.2 or 0.7). Wrap filters in foil and store on ice until they can be frozen on the ship at -20°C.

Nutrients- Stored on ice until they can be frozen on the ship at -20°C

Coral tissue- Once on the ship, coral fragments will be airbrushed to remove tissue and stored in Falcon tubes in a -80°C freezer.

Disposition of Organisms

Upon completion of analysis, coral skeletons may be returned to PMNM under the guidance of the cultural working group. Coral fragments may also be made available to other scientists upon approval from PMNM. All samples will be transported back to Honolulu on the marine vessel, then will be shipped back to UH Maui College, Texas A&M University, or delivered to UH Manoa for analysis.

The results of this analysis will be made publicly available, and provided to PMNM. Additionally, the researchers are collaborating with NOAA partners to learn about sites that have been sampled in the past, which will help to inform sampling in this work and minimize duplicate locations. The researchers are collaborating with Dr. Chris Wall to analyze his coral tissue samples from PMNM, which were collected in 2015. These samples will minimize collection at atolls other than PHR, and will also provide a baseline of isotopic data from coral tissues prior to the *Chondria* outbreak.

MMB Agency Reviewer Questions and Applicant Responses:

1. Please be aware working around Pearl and Hermes will require special conditions attached to your permit. Our team is in the process of finalizing a BMP on this subject. Should also make all efforts to have Pearl and Hermes the last stop and that small boats used to transport to P&H are not be used at any other location in the monument. Jonathon Martinez will be the POC for these measure and can reach out to him for any questions (but please cc me, Phillip Howard).

a. We will follow all guidelines and recommendations for BMP within the monument. We are currently in the process of discussing cruise logistics with PMNM staff.

2. Can you provide clarification on if the proposal is to have single dedicated trip out and back to P&H or will P&H be the last stop on the trip after visiting other locations?

a. We are currently in the process of discussing logistics for two cruises with PMNM staff. Right now, it looks as though this proposal will be on a July cruise dedicated to Manawai, although we may stop at Lalo on the way up.

3. Recommend sterilization of water samples as soon as possible and that water storage vessels be treated carefully to prevent potential leaks from the containers. Consider secondary containment. Recommend not returning coral fragments from P&H to the monument after the project is done. Jonathon Martinez

will be the POC for these measure and can reach out to him or any questions (but please cc me, Phillip Howard).

a. Ok. We will communicate and coordinate with Jonathon Martinez related to these measures.

4. Kalani Quiocho is “wondering if there are any outreach and education opportunities through Dr. Kealoha at UH Maui College. Always looking for PMNM opportunities on neighbor islands too. Can't wait for Hāna Limu Festival again!”

a. I would love our students to have more opportunities to learn about PMNM and marine science in general! Feel free to email me and we can talk story! andreake@hawaii.edu

5. Will be recommending the following as a special condition of the permit: “Permittee will implement collection/sampling design that removes a sustainable proportion from the local population of target organisms and make efforts to distribute collection activities across shoreline/reef flat/benthic areas, so as not to consolidate the impacts of collection in one location (if applicable/if collecting samples).”

a. Ok. The purpose of collecting coral tissue samples is to understand oceanographic and nutrient dynamics in areas of both high and low Chondria cover. Therefore, we will distribute collection activities atoll-wide.

6. Is it possible for the researcher to collect fragments from colonies which are less than 1 m in diameter, in order to reduce potential impacts to older coral colonies?

a. We will be collecting coral tissue samples near the algae collections. The sampler can target collections from colonies less than 1 m in diameter. This is now included in the permit request.

7. Is this possible for the research objective or are samples from colonies greater than 1 m in diameter necessary in order to collect certain data? If so, can researcher provide reasoning for sampling coral colonies greater than 1 m in diameter, and what proportion of the total sample size needs to be collected from colonies greater than 1 m in diameter?

a. I cannot think of any reason why we would need to specifically collect from colonies greater than 1 m. Therefore, the sampler will try to identify coral collection from colonies less than 1 m in diameter.

8. NMFS request that the applicant contact the Hawaiian Monk Seal Research Program (Michelle Barbieri at Michelle.Barbieri@noaa.gov) and Marine Turtle Biology and Assessment Program (Yonat Swimmer at Yonat.Swimmer@noaa.gov, and Summer Martin at Summer.Martin@noaa.gov) to discuss communications/expectations for COVID safety in the field as teams may be deployed in the same place and time as the applicant.

a. Ok, we will coordinate this with other scientists on the cruise as well.

9. A maximum of 60 coral samples at 2-3cm² size is not a major concern. However there should be a minimum size requirement for a colony in order for it to be sampled. Ex: the sample size should be no

more than X% (10, 25, etc.) of the total colony size. Could you detail methods that would codify this requirement, for us to review?

a. I am not aware of a specific method or SOP that details coral collection to minimize impact in this way. However, we have consulted with Dr. Chris Wall (who has considerable experience with coral tissue sampling including in the NWHI) and he has advised sampling only adult colonies (although see above, targeting less than 1 m diameter) or colonies with at least 6 branch tips. This is now included in the permit application.

10. Are specific coral species being targeted or just Pocillopora? Having samples to compare within a family group may present a better analysis and results.

a. We will target Pocillopora since literature has suggested these corals may exhibit a high degree of heterotrophy. We will also target Montipora. Chris Wall has coral tissue samples of Montipora collected at Manawai (and throughout the NWHI) in 2015 and these samples will serve as a nice before/after Chondria outbreak comparison for the isotope analysis.

11. How close to land will your permitted activities take place across the Monument?

a. Sampling activities will not be conducted near land.

12. Please consider using Hawaiian place and species names wherever feasible on future permits and reports to help in the revitalization and normalization of 'Ōlelo Hawai'i.

a. Ok thank you for this suggestion, and we have revised the current permit application to include this.

13. Following strict biosecurity protocols will be paramount for this activity. Please read and follow all monument BMPs carefully, especially 006 "General Storage and Transport Protocols for Collected Samples", and 011 "Disease and Introduced Species Prevention Protocols".

a. Ok, I will ensure all individuals involved in this permit application read monument BMPs.

14. Considering the elevated biosecurity risk, please be sure to do a thorough step-by-step review of your methods and work plan with a Monument representative who is familiar with marine biosecurity, prior to departing.

a. Ok.

15. Please abide by BMP 004 "Best Management Practices for Boat Operations and Diving Activities" while operating small boats.

a. OK

16. We request that a copy of all publications be sent to Co-Managing agencies, once available.

a. Ok.

17. What does CTD stand for? What is a CTD cast? And what does it entail?" (Mentioned it multiple times but don't explain what it stands for)

a. Thank you for pointing this out. I have revised the permit request to include the following information: To accomplish this activity, we would conduct handheld CTD (conductivity, temperature, depth) casts off the side of a small boat within and around PHA. CTDs allow for depth profiles of both temperature and salinity to provide information about oceanographic conditions below the surface ocean. And this to give an idea of size: Casts will be conducted using a Castaway CTD by Sontek, which is a hand-held CTD (dimensions 7 cm diameter and 20 cm height, 1 lb. weight) designed for coastal profiling to depths of 100 m.

The activities proposed by the applicant directly support the Monument Management Plan's (PMNM MMP Vol. 1, 2008) priority management needs in the Marine Conservation Science action plan (3.1.1). Activities noted as part of these plans include monitoring and characterizing shallow and deep-water habitats:

- MCS-1: Continue and enhance research, characterization, and monitoring of marine ecosystems for the life of the plan, as appropriate.

The activities described above may require the following regulated activities to occur in State waters:

- ☒ Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving monument resource
- ☒ Touching coral, living or dead
- ☒ Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

The applicant would abide by the following PMNM Best Management Practices (BMPs) while conducting the aforementioned activities within the PMNM: Best Management Practices for Human Hazards to Seabirds (BMP#003); Boat Operations and Diving Activities (BMP #004); General Storage and Transport Protocols for Collected Samples (BMP#006); Special Conditions and Rules for Moving Between Islands/Atolls and Packing for Field Camps (BMP#007); Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles (BMP#009); Marine Wildlife Viewing Guidelines (BMP #010); Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (BMP #011); and Best Management Practices for Maritime Heritage Sites (BMP#017).

REVIEW PROCESS:

The permit application was sent out for review and comment to the following scientific and cultural entities: Hawaii Division of Aquatic Resources, Hawaii Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service Hawaiian and Pacific Islands National Wildlife

Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application was posted on the Monument Web site in the spring of 2021, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy

Environmental Compliance:

NEPA / HEPA: (check-one)

- ☒ Categorical Exclusion / Exempt Class: 5
☐ EA
☐ EIS

Other Consultations: (ESA/MMPA Section 7; NHPA Section 106, etc.)

- An informal review of all aforementioned activities following section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. 1855(b)) was completed on 5/11/2021. NMFS-prescribed conditions will be reflected in the PMNM permit, prior to issuance.
- On 5/4/2021, NMFS concurred that all proposed permit activities would be covered under PMNM's programmatic ESA Section 7 informal consultation. NMFS-prescribed conditions will be reflected in the PMNM permit, prior to issuance.
- To mitigate risk of spreading the *Chondria tumulosa* within the monument and main Hawaiian Islands discussions with subject matter experts occurred. Agreed upon *Chondria* mitigation language will be added into the final permit as special conditions.

Has Applicant been granted a permit from the State in the past? Yes ☐ No ☒

If so, please summarize past permits:

Have there been any a) violations: Yes ☐ No ☒

b) Late/incomplete post-activity reports: Yes ☐ No ☒

Are there any other relevant concerns from previous permits? Yes ☐ No ☒

This activity is exempt from the preparation of an environmental assessment under the Authority of Chapter 343, HRS and Chapter 11-200.1, HAR. In accordance with the revised Exemption List For The Department Of Land And Natural Resources (Concurred on by the Environmental Council on November 10, 2020), this activity does not require a declaration of exemption or "exemption notice" as this activity

falls under “**Part 1**” of its exemption class. This revision separates exemption lists into categories listed in §11-200.1-16 (a)(1) and (2). Activities categorized as “**Part 1**” will fall under §11-200.1-16 (a) (1). **Activities categorized as “Part 2” will require an exemption notice** and fall under §11-200.1-16 (a) (2). However, in order to be transparent for BLNR review purposes, this exemption notice had been drafted.

Consulted Parties: The permit application was sent out for review and comment to the following scientific and cultural entities: Hawaii Division of Aquatic Resources, Hawaii Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service Hawaiian and Pacific Islands National Wildlife Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application has been posted on the Monument Web site, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument’s Public Notification Policy.

Exemption Determination: After reviewing §11-200.1-15, HAR, including the criteria used to determine significance under §11-200.1-13, HAR, DLNR has concluded that the activities under this permit would have minimal or no significant effect on the environment and that issuance of the permit is categorically exempt from the requirement to prepare an environmental assessment based on the following analysis:

1. All activities associated with this permit have been evaluated as a single action. Since this permit involves an activity that is precedent to a later planned activity, i.e., the same methodology used throughout the permit period, the categorical exemption determination here will treat all planned activities as a single action under §11-200.1-10, HAR.

2. The General Exemption Type #5 for Basic Data Collection, Research and Experimental Management with no Serious or Major Environmental Disturbance Appears to Apply. §11-200.1-16 (a) (1) and §11-200.1-16 (a) (2), HAR, exempts the class of actions that involve “basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource.” This exemption type has been interpreted to include the collection of the limited amounts of coral and water samples, to study biogeochemical and oceanographic processes, such as those being proposed.

The proposed activities here appear to fall squarely under the general exemption type identified under HAR §11-200.1-16 (a) (1), as described under the revised 2020 DLNR Exemption List (Concurred on by the Environmental Council on November 10, 2020), under the general exemption type #5 (Part 1), items #13 and #15, which includes, respectively, “research that the Department declares is designed specifically to monitor, conserve, or enhance native species or native species' habitat” and “game and non-game wildlife surveys, vegetation and rare plant surveys, aquatic life surveys, inventory studies, new transect lines, photographing, recording, sampling, collection, culture, and captive propagation”.

The applicant would abide by the following PMNM Best Management Practices (BMPs) while conducting the aforementioned activities within the PMNM: Best Management Practices for Human Hazards to Seabirds (BMP#003); Boat Operations and Diving Activities (BMP #004); General Storage and Transport Protocols for Collected Samples (BMP#006); Special Conditions and Rules for Moving Between Islands/Atolls and Packing for Field Camps (BMP#007); Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles (BMP#009); Marine Wildlife Viewing Guidelines (BMP #010); Disease

and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (BMP #011); and Best Management Practices for Maritime Heritage Sites (BMP#017).

As discussed below, no significant disturbance to any environmental resource is anticipated. Thus, so long as the below considerations are met, the general exemption types should include the action now contemplated.

3. Cumulative Impacts of Actions in the Same Place and Impacts with Respect to the Potentially Particularly Sensitive Environment Will Not be Significant. Even where a categorical exemption appears to include a proposed action, the action cannot be declared exempt if “the cumulative impact of planned successive actions in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant in a particularly sensitive environment.” §11-200.1-15 (d), HAR. To gauge whether a significant impact or effect is probable, an exempting agency must consider every phase of a proposed action, any expected primary and secondary consequences, the long-term and short-term effects of the action, the overall and cumulative effect of the action, and the sum effects of an action on the quality of the environment. §11-200.1-13, HAR.

The researchers on this project will collect small subsamples of coral colonies and water samples to limit disturbance. The researchers will also implement a collection/sampling design that removes a sustainable proportion from the local population of target organisms and make efforts to distribute collection activities across shoreline/reef flat/benthic areas, so as not to consolidate the impacts of collection in one location (if applicable/if collecting samples) and will collect samples of coral from colonies which are less than one (1) meter in diameter (to the extent practicable) in order to minimize impact to older colonies. The information this research provides will far outweigh the disturbance associated with coral collection since managers will be more informed to respond to the current alga outbreak that is decimating the coral reef ecosystem, as well as potential future outbreaks across the archipelago. The management implications and value of this research far outweighs the adverse impact on Monument resources and ecological integrity. The PHA ecosystem has been devastated by the *Chondria* outbreak, and the other islands/atolls of the Hawaiian Archipelago may already be affected as well. The information generated by the requested activities will help scientists and managers better understand the oceanographic conditions under which this alga grows, and may help to predict and/or prevent the spread of *Chondria* within the Monument and across the Hawaiian Archipelago. With that in mind, significant cumulative impacts are not anticipated as a result of this activity, and numerous safeguards further ensure that the potentially sensitive environment of the project area will not be significantly affected. All activities will be conducted in a manner compatible with the management direction of the Monument Proclamation in that the activities do not diminish monument resources, qualities, and ecological integrity, or have any indirect, secondary, cultural, or cumulative effects. The joint permit review process did not reveal any anticipated indirect or cumulative impacts that would occur as a result of these activities.

Since no significant cumulative impacts or significant impacts with respect to any particularly sensitive aspect of the project area are anticipated, the categorical exemptions identified above should remain applicable.

4. Overall Impacts will Probably have a Minimal or No Significant Effect on the Environment. Any foreseeable impacts from the proposed activity will probably be minimal, and further mitigated by general and specific conditions attached to the permit. Specifically, all research activities covered by this permit

will be carried out with strict safeguards for the natural, historic, and cultural resources of the Monument as required by Presidential Proclamation 8031, other applicable law and agency policies and standard operating procedures.

Conclusion. Upon consideration of the permit to be approved by the Board of Land and Natural Resources, the potential effects of the above listed project as provided by Chapter 343, HRS and Chapter 11-200.1 HAR, have been determined to be of probable minimal or no significant effect on the environment and exempt from the preparation of an environmental assessment.

Papahānaumokuākea Marine National Monument
RESEARCH Permit Application

NOTE: *This Permit Application (and associated Instructions) are to propose activities to be conducted in the Papahānaumokuākea Marine National Monument. The Co-Trustees are required to determine that issuing the requested permit is compatible with the findings of Presidential Proclamation 8031. Within this Application, provide all information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Papahānaumokuākea Marine National Monument (Monument).*

ADDITIONAL IMPORTANT INFORMATION:

- Any or all of the information within this application may be posted to the Monument website informing the public on projects proposed to occur in the Monument.
- In addition to the permit application, the Applicant must either download the Monument Compliance Information Sheet from the Monument website OR request a hard copy from the Monument Permit Coordinator (contact information below). The Monument Compliance Information Sheet must be submitted to the Monument Permit Coordinator after initial application consultation.
- Issuance of a Monument permit is dependent upon the completion and review of the application and Compliance Information Sheet.

INCOMPLETE APPLICATIONS WILL NOT BE CONSIDERED

Send Permit Applications to:
NOAA/Inouye Regional Center
NOS/ONMS/PMNM/Attn: Permit Coordinator
1845 Wasp Blvd, Building 176
Honolulu, HI 96818
nwhipermit@noaa.gov
PHONE: (808) 725-5800 FAX: (808) 455-3093

SUBMITTAL VIA ELECTRONIC MAIL IS PREFERRED BUT NOT REQUIRED. FOR ADDITIONAL SUBMITTAL INSTRUCTIONS, SEE THE LAST PAGE.

Papahānaumokuākea Marine National Monument Permit Application Cover Sheet

This Permit Application Cover Sheet is intended to provide summary information and status to the public on permit applications for activities proposed to be conducted in the Papahānaumokuākea Marine National Monument. While a permit application has been received, it has not been fully reviewed nor approved by the Monument Management Board to date. The Monument permit process also ensures that all environmental reviews are conducted prior to the issuance of a Monument permit.

Summary Information

Applicant Name: Andrea Kimiko Kealoha

Affiliation: University of Hawaii Maui College

Permit Category: Research

Proposed Activity Dates: June 1- Aug 30, 2021, dependent on the availability of a ship

Proposed Method of Entry (Vessel/Plane): Marine Vessel (TBD)

Proposed Locations: Nihoa, FFS, LIS, LAY, PHA, MID, KUR, Gardner, Maro and Mokumanamana

Estimated number of individuals (including Applicant) to be covered under this permit: 4

Estimated number of days in the Monument: 30

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...
investigate the role of oceanographic phenomena, such as upwelling, in the invasive *Chondria* (iC) outbreak at PHA. This project combines hydrographic measurements with stable isotope analysis of coral tissues to understand oceanographic processes that may influence the presence, growth and distribution of iC at PHA. While the hydrographic data provide a snapshot of *in situ* oceanographic conditions, coral tissue samples may reflect the integrated signatures of upwelling events over longer times scales, and provide information on nutrient sources and cycling within the ecosystem.

b.) To accomplish this activity, we would
conduct handheld CTD casts within and around PHA. Casts will be planned at defined locations and spatial intervals depending on cruise schedule and allotted time for water sampling. Discrete water samples will be collected using a Niskin bottle deployed at 1 m and 5 m. Analyses will include dissolved inorganic nutrients, carbonate chemistry, and Chl *a*. Coral tissue samples for stable isotope analysis will be collected at shallow, consistent depths within and around PHA, and in areas of both high and low iC cover. Stable isotope analyses will also be performed on several samples of plankton, particulate organic matter and the seawater end-members. The isotope data collected in this project will complement the algal stable isotope analyses conducted by Spalding.

c.) This activity would help the Monument by ... providing insight into the oceanographic drivers of the iC outbreak that has devastated the ecosystem at PHA. For example, CTD casts will generate temperature and salinity profiles that may help to identify locations for upwelling. Similarly, water samples for nutrients, carbonate chemistry and Chl *a* will also help to identify upwelling, as well as provide information on biogeochemical conditions that fuel iC presence, growth and distribution. Stable isotopes are useful in providing information about nutrient sources and cycling. Combined, these data will 1) provide valuable insight into the oceanographic processes that influence the presence, growth and distribution of *Chondria* at PHA, and 2) provide recommendations for targeted management and monitoring locations.

Other information or background:

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Kealoha, Andrea, K

Title: Director of Water Quality Lab, University of Hawaii Maui College

1a. Intended field Principal Investigator (See instructions for more information): Arik Dadez, University of Hawaii Maui College - SEE ORIGINAL APPLICATION FOR CONTACT INFO

2. Mailing address (street/P.O. box, city, state, country, zip): SEE ORIGINAL APPLICATION FOR CONTACT INFO

Phone: SEE ORIGINAL APPLICATION FOR CONTACT INFO

Fax:

Email: SEE ORIGINAL APPLICATION FOR CONTACT INFO

For students, major professor's name, telephone and email address:

3. Affiliation (institution/agency/organization directly related to the proposed project):
University of Hawaii Maui College

4. Additional persons to be covered by permit. List all personnel roles and names (if known at time of application) here (e.g. John Doe, Research Diver; Jane Doe, Field Technician):

Heather Spalding, research diver

Taylor Richmond, research diver

TBD, water sampler

TBD, water sampler

Section B: Project Information

5a. Project location(s):

<input checked="" type="checkbox"/> Nihoa Island	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Necker Island (Mokumanamana)	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> French Frigate Shoals	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Gardner Pinnacles	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Maro Reef			
<input checked="" type="checkbox"/> Laysan Island	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Lisianski Island, Neva Shoal	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Pearl and Hermes Atoll	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Midway Atoll	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Kure Atoll	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input type="checkbox"/> Monument Expansion Area			
<input type="checkbox"/> Other			

NOTE: Shallow water is defined by water less than 100 meters in depth.

☐ Remaining ashore on any island or atoll (with the exception of Sand Island, at Midway Atoll and field camp staff on other islands/atolls) between sunset and sunrise.

NOTE: There is a fee schedule for people visiting Midway Atoll National Wildlife Refuge via vessel and aircraft.

Location Description:

We plan to visit PHA. However, other islands/atolls are a possibility depending on research needs of other scientists on the ship. At each island/atoll we visit, we will perform CTD casts, collect water samples, and collect coral tissue samples for isotopic analysis. We will follow best management practices for boat operations and water/biological sampling. Although the iC has been identified at PHA, it is a possibility that the alga has spread to other locations. Therefore if we visit other locations that are affected by iC, it will be important that we are able to collect data.

5b. Check all applicable regulated activities proposed to be conducted in the Monument:

- ☒ Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving Monument resource
- ☐ Drilling into, dredging, or otherwise altering the submerged lands other than by anchoring a vessel; or constructing, placing, or abandoning any structure, material, or other matter on the submerged lands
- ☐ Anchoring a vessel
- ☐ Deserting a vessel aground, at anchor, or adrift
- ☐ Discharging or depositing any material or matter into the Monument
- ☒ Touching coral, living or dead

- ☐ Possessing fishing gear except when stowed and not available for immediate use during passage without interruption through the Monument
- ☐ Attracting any living Monument resource
- ☐ Sustenance fishing (Federal waters only, outside of Special Preservation Areas, Ecological Reserves and Special Management Areas)
- ☐ Subsistence fishing (State waters only)
- ☒ Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

6. Purpose/Need/Scope *State purpose of proposed activities:*

In 2016, NOAA observed a new species of mat-forming red alga at PHA. By 2019, the alga was widespread and documented from 1-19 m on the north, west and east sides. The alga exhibits invasive qualities and the mats overgrow and smother corals and macroalgae, causing mortality. Given its rapid increase in areal coverage, this alga has the potential to significantly alter the PHA ecological structure, as well as the ecology at other islands and atolls within the Hawaiian Archipelago if the alga spreads. However, since this is a new species of alga, little is known about its origin, ecology or growth conditions.

The purpose of the proposed activities is to collect oceanographic data that will provide insight into the factors that contribute to the presence and distribution of *Chondria* at PHA. These data will increase understanding for biogeochemical and oceanographic processes that may explain the presence and proliferation of *Chondria*, enable mapping and prediction of further alga spread across the Hawaiian Archipelago, and assist in the development of a tool for identification of areas for targeted management and increased monitoring of potential outbreaks.

To do this, we will 1) collect 135 water samples (~60 ml) for dissolved inorganic nutrients, 2) collect 135 water samples (~500 ml) for carbonate chemistry analysis, 3) collect 50 samples for chl *a* analysis, 4) collect 60 samples of coral tissue for stable isotope analysis and 5) perform CTD casts for temperature and salinity depth profiles.

*Considering the purpose of the proposed activities, do you intend to film / photograph federally protected species beyond the protocols provided in PMNM Best Management Practices (<https://www.papahanaumokuakea.gov/permit/bestmanagement.html>)? Yes ☐ No ☒

If so, please list the species you specifically intend to target.

For a list of terrestrial species protected under the Endangered Species Act visit:

<http://www.fws.gov/endangered/>

For a list of marine species protected under the Endangered Species Act visit:

<http://www.nmfs.noaa.gov/pr/species/esa/>

For information about species protected under the Marine Mammal Protection Act visit:

<http://www.nmfs.noaa.gov/pr/laws/mmpa/>

7. Answer the Findings below by providing information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Monument:

The Findings are as follows:

a. How can the activity be conducted with adequate safeguards for the cultural, natural and historic resources and ecological integrity of the Monument?

We do not expect CTD casts and water sample collection to impact monument resources or ecological integrity.

We will be collecting coral tissue samples for stable isotope analysis, and will limit the number of samples to 60 at most. Coral fragments (2-3 cm²) will be taken as a small subsample of the colony, leaving the remainder of the colony intact. Collection will be done by carefully removing an upward portion coral fragment using hammer and chisel. Apical regions of corals are sites of active growth and therefore recover quickly relative to other areas of the coral. Species types and locations will be chosen to accompany the algal team collection, which means that our collections will be limited to only those needed to fulfill the goal of our grant. Collection equipment will be inspected and disinfected between sampling areas to mitigate the spread of invasive species. Best efforts will be made to ensure that sample collection does not disturb marine life or resources in the surrounding environment.

Other than corals, we will not touch any cultural or historical resources/artifacts within the monument.

b. How will the activity be conducted in a manner compatible with the management direction of this proclamation, considering the extent to which the conduct of the activity may diminish or enhance Monument cultural, natural and historic resources, qualities, and ecological integrity, any indirect, secondary, or cumulative effects of the activity, and the duration of such effects?

We will collect a small subsample of the coral colony in order to limit disturbance. The information this research provides will far outweigh the disturbance associated with coral collection since managers will be more informed to respond to the current alga outbreak that is decimating the coral reef ecosystem, as well as potential future outbreaks across the archipelago.

c. Is there a practicable alternative to conducting the activity within the Monument? If not, explain why your activities must be conducted in the Monument.

There is no practicable alternative to conducting the activity within the Monument. The iC is located at PHA, and so we must understand the oceanographic and biogeochemical processes at PHA that contribute to the presence of this *Chondria*. Furthermore, the information we gather may help to predict or prevent the spread of iC to other locations throughout the Monument and remaining Hawaiian Islands.

d. How does the end value of the activity outweigh its adverse impacts on Monument cultural, natural and historic resources, qualities, and ecological integrity?

The management implications and value of this research far outweighs the adverse impact on Monument resources and ecological integrity. The PHA ecosystem has been

devastated by the *Chondria* outbreak, and the other islands/atolls of the Hawaiian Archipelago may already be affected as well. The information generated by the requested activities will help scientists and managers better understand the oceanographic conditions under which this alga grows, and may help to predict and/or prevent the spread of iC within the Monument and across the Hawaiian Archipelago.

e. Explain how the duration of the activity is no longer than necessary to achieve its stated purpose.

The fieldwork component of this research will be performed under the minimal time required to achieve the goal and objectives of the grant. Collaborators on the grant (but under a separate permit request) will be on the same research cruise. These scientists possess extensive information on algal distribution collected during previous cruises and we will use that data to refine coral and alga collection locations. Water sampling and CTD casts will be conducted efficiently to maximize spatial resolution and minimize activity duration. Prior to the research cruise we are completing a comprehensive oceanographic analysis on all available data, and that will help to inform the water sampling plan as well.

f. Provide information demonstrating that you are qualified to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.

Dr. Andrea Kealoha is a professor at UH Maui College and is the Director of the Water Quality Lab. She is an expert in coral reefs and biogeochemical processes, and recently published an article on upwelling as a cause of the mortality event in the Flower Garden Banks National Marine Sanctuary. Andrea has participated in two previous research cruises to the Monument, both of which involved CTD operations and water sample collection similar to the activities proposed in the permit request. She has also conducted field operations in the FGBNMS, and as a former Nancy Foster scholar, has visited multiple national marine sanctuaries. Hence, she is sensitive to and respectful of the cultural, natural and historical importance of these ecosystems.

g. Provide information demonstrating that you have adequate financial resources available to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.

This project is supported by a NFWF grant to PI A. Sherwood. Kealoha is a co-PI on the grant and sufficient funds have been dedicated to the oceanographic component described in this request.

h. Explain how your methods and procedures are appropriate to achieve the proposed activity's goals in relation to their impacts to Monument cultural, natural and historic resources, qualities, and ecological integrity.

The methods we will use in this study have been used previously throughout the NWHI and at other locations by Dr. Kealoha and other scientists. In the current project, we will use a compact CTD and single niskin for chemistry profiles. This will be less intrusive than the large shipboard rosette and niskin bottles typically used. The data generated by profiling will provide information on the oceanography of PHA, including the depth

structure of various parameters, physical and biogeochemical processes, and long-term trends.

Stable isotopes provide useful information about sources of nutrients, biogeochemical cycling and trophic structure within an ecosystem. We will collect coral tissue samples for $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ to understand nutritional input from allocthonous sources. For example, studies suggest that corals acquire more energy through heterotrophy when particulate nutrients are available (e.g., during upwelling). This increased heterotrophy would be reflected in the isotopic signature of coral tissue samples. Thus, by collecting coral tissue samples from multiple locations around the atoll, we may be able to identify specific locations for increased inputs of particulate nutrients. These data also complement and will be compared to the algae stable isotope data collected by H. Spalding.

To ensure robustness of the data, species of corals that are known to enhance heterotrophic behavior during periods of increased organic matter input will be collected (e.g., *Pocillopora* and *Montipora*).

i. Has your vessel been outfitted with a mobile transceiver unit approved by OLE and complies with the requirements of Presidential Proclamation 8031?

Yes, the vessel will be equipped with the appropriate mobile transceiver unit.

j. Demonstrate that there are no other factors that would make the issuance of a permit for the activity inappropriate.

There are no other factors that would make the issuance of this permit inappropriate.

8. Procedures/Methods:

1) CTD casts: Casts will be conducted using a Castaway CTD by Sontek, which is a hand-held CTD designed for coastal profiling to depths of 100 m. Sensors include pressure, temperature and salinity, and the CTD is equipped with a GPS. We will perform casts around the atoll (east, west, north and south) and at multiple locations down to ~ 100 m.

2) Water sampling: With each CTD cast, we will also lower a 2.5 L niskin by hand. The niskin will be tripped at 1 m, and 5 m at select locations. From each 2.5 L cast we will collect water samples for dissolved inorganic nutrients (60 ml), total alkalinity and dissolved inorganic carbon (500 ml) and chl *a* (120 ml).

3) Coral tissue: Coral fragment samples will be collected near the locations that alga samples are collected. Those locations are TBD. We will collect several species of scleractinian corals, with the majority being *Pocillopora* if available since these are known to exhibit heterotrophic feeding. Coral fragments will be 2-3 cm² in size and collected from the upper portion of the coral using hammer and chisel. Fragments will be placed in whirl paks with seawater, and on ice until the boat returns to the wetlab on the ship.

4) Sample processing:

TA/DIC- Immediately after water collection into bottles, samples are preserved with 100 µl mercuric chloride to prevent further biological processes. The cap is sealed with Apeizon grease to prevent air-sea gas exchange.

Chl a- Filter 120 ml seawater using 10% HCl pre-rinsed syringe and combusted 25 mm GFF filters (pore size 0.2 or 0.7). Wrap filters in foil and store on ice until they can be frozen on the ship at -20°C.

Nutrients- Stored on ice until they can be frozen on the ship at -20°C

Coral tissue- Once on the ship, coral fragments will be airbrushed to remove tissue and stored in Falcon tubes in a -80°C freezer.

NOTE: If land or marine archeological activities are involved, contact the Monument Permit Coordinator at the address on the general application form before proceeding.

9a. Collection of specimens - collecting activities (would apply to any activity): organisms or objects (List of species, if applicable, attach additional sheets if necessary):

Common name:

Scleractinian corals

Scientific name:

e.g., *Pocillopora* and *Montipora*

& size of specimens:

Small fragments (2-3 cm²) with no more than 60 collected at PHR and no more than 30 at other locations.

Collection location:

PHR primarily, but other locations may include Nihoa, Necker, FFS, Garner, Lis, Laysan, Midway, Maro, Kure

☐ Whole Organism ☒ Partial Organism

9b. What will be done with the specimens after the project has ended?

Upon completion of analysis, coral skeletons may be returned to PMNM under the guidance of the cultural working group. Coral fragments may also be made available to other scientists upon approval from PMNM .

9c. Will the organisms be kept alive after collection? ☐ Yes ☒ No

• General site/location for collections:

PHA, potentially other island/atolls listed

• Is it an open or closed system? ☐ Open ☐ Closed

na

- Is there an outfall? ☐ Yes ☐ No

na

- Will these organisms be housed with other organisms? If so, what are the other organisms?

na

- Will organisms be released?

na

10. If applicable, how will the collected samples or specimens be transported out of the Monument?

All samples will be transported back to Honolulu on the marine vessel, then will be shipped back to UH Maui College, Texas A&M University, or delivered to UH Manoa for analysis.

11. Describe collaborative activities to share samples, reduce duplicative sampling, or duplicative research:

The results of this analysis will be made publically available, and provided to PMNM. Additionally, we are collaborating with NOAA partners to learn about sites that have been sampled in the past, which will help to inform sampling in this work and minimize duplicate locations. We are collaborating with Dr. Chris Wall to analyze his coral tissue samples from PMNM, which were collected in 2015. These samples will minimize collection at atolls other than PHR, and will also provide a baseline of isotopic data from coral tissues prior to the iC outbreak.

12a. List all specialized gear and materials to be used in this activity:

SCUBA gear for coral tissue collection

Castaway handheld CTD

Niskin (2.5 L)

YSI Proplus multiparameter sonde

12b. List all Hazardous Materials you propose to take to and use within the Monument:

2- 5 mls of mercuric chloride to preserve carbonate chemistry samples

13. Describe any fixed installations and instrumentation proposed to be set in the Monument:

na

14. Provide a time line for sample analysis, data analysis, write-up and publication of information:

Sample and data analyses, and write-up/publication will be completed within 2 yrs of sample collection

15. List all Applicants' publications directly related to the proposed project:

Kealoha AK, Shamberger KEF, DiMarco S, Thyng K, Hetland R, Manzello DP, Slowey N, Enochs I. (2020) Surface water CO₂ variability in the Gulf of Mexico (1996-2017). *Scientific Reports*. 10(12279): doi.org/10.1038/s41598-020-68924-0

Doo SS, **Kealoha AK**, Andersson A, Cohen A, Hicks TL, Johnson ZI, Long MH, McElhany P, Mollica N, Shamberger KEF, Silbiger N, Takeshita Y, Busch DS. (2020) The challenges of detecting and attributing ocean acidification impacts on marine ecosystems. *Frontiers in Marine Science*. <https://doi.org/10.1093/icesjms/fsaa094>

Kealoha AK, Doyle SM, Shamberger KEF, Sylvan JB, Hetland RD, DiMarco SF (2019) Localized hypoxia may have caused coral reef mortality at the Flower Garden Banks. *Coral Reefs*. 39(1):119-132

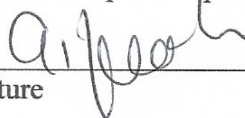
Kealoha AK, Shamberger KEF, Reid EC, Davis KA, Lentz SJ, Brainard RE, Oliver TA, Rappe MS, Roark EB, Rii YM (2019) Heterotrophy of oceanic particulate organic matter elevates net ecosystem calcification. *Geophysical Research Letters*. 46(16): doi.org/10.1029/2019GL083726

Kealoha AK, Mackenzie FT, Kosaki RK, Alin SR, Winn CD (2017) Carbon system dynamics of a pristine coral reef ecosystem: French Frigate Shoals. *Aquatic Geochemistry*. 23:75-88

Kealoha AK, Kahng SE, Mackenzie FT, Alin SR, Kosaki RK, Brainard RE, Winn CD (2015) Latitudinal trends and drivers in the CO₂-carbonic acid system of Papahānaumokuākea Marine National Monument. *Aquatic Geochemistry*. 21:535-553

With knowledge of the penalties for false or incomplete statements, as provided by 18 U.S.C. 1001, and for perjury, as provided by 18 U.S.C. 1621, I hereby certify to the best of my abilities under penalty of perjury of that the information I have provided on this application form is true and correct. I agree that the Co-Trustees may post this application in its entirety on the Internet. I understand that the Co-Trustees will consider deleting all information that I have identified as "confidential" prior to posting the application.

Signature



Date

2/1/21

SEND ONE SIGNED APPLICATION VIA MAIL TO THE MONUMENT OFFICE BELOW:

NOAA/Inouye Regional Center
NOS/ONMS/PMNM/Attn: Permit Coordinator
1845 Wasp Blvd, Building 176
Honolulu, HI 96818
FAX: (808) 455-3093

DID YOU INCLUDE THESE?

☐ Applicant CV/Resume/Biography

- ☐ Intended field Principal Investigator CV/Resume/Biography
- ☐ Electronic and Hard Copy of Application with Signature
- ☐ Statement of information you wish to be kept confidential
- ☐ Material Safety Data Sheets for Hazardous Materials

Papahānaumokuākea Marine National Monument Compliance Information Sheet

1. Updated list of personnel to be covered by permit. List all personnel names and their roles here (e.g. John Doe, Diver; Jane Doe, Field Technician, Jerry Doe, Medical Assistant): Arik Dadez, field tech/water sampler; Heather Spalding, research diver; Taylor Richmond, research diver

2. Specific Site Location(s): (Attach copies of specific collection locations): Manawai
(see attached map and spreadsheet for planned collection locations)

3. Other permits (list and attach documentation of all other related Federal or State permits): NA

3a. For each of the permits listed, identify any permit violations or any permit that was suspended, amended, modified or revoked for cause. Explain the circumstances surrounding the violation or permit suspension, amendment, modification or revocation. NA

4. Funding sources (Attach copies of your budget, specific to proposed activities under this permit and include funding sources. See instructions for more information): NFWF Papahānaumokuākea Research and Conservation Fund, #68602
Title: Mitigating impacts from environmental stressors: early response to the Chondria outbreak at Pearl and Hermes Atoll, and Hurricane Walaka impacts at French Frigate Shoals.
NFWF funds: \$299,890.90
Matching funds: \$306,021

5. Time frame:

Activity start: 8/1/20 (grant start date)

Activity completion: 2/28/22 (grant end date)

Dates actively inside the Monument:

From: 7/10/21

To: 7/25/21

Describe any limiting factors in declaring specific dates of the proposed activity at the time of application: Weather, ship mechanical delays and/or COVID effects

Personnel schedule in the Monument: listed in #1

6. Indicate (with attached documentation) what insurance policies, bonding coverage, and/or financial resources are in place to pay for or reimburse the Monument trustees for the necessary search and rescue, evacuation, and/or removal of any or all persons covered by the permit from the Monument: See attached insurance policy for HRG vessel. All permittees entering the monument have liability and workers compensation insurance provide by their employers

7. Check the appropriate box to indicate how personnel will enter the Monument:

- ☒ Vessel
☐ Aircraft

Provide Vessel and Aircraft information: M/V Imua

8. The certifications/inspections (below) must be completed prior to departure for vessels (and associated tenders) entering the Monument. Fill in scheduled date (attach documentation):

- ☒ Rodent free, Date: July 7, 2021
☒ Tender vessel, Date: July 7, 2021
☐ Ballast water, Date: N/A Fresh water only
☒ Gear/equipment, Date: July 8, 2021
☒ Hull inspection, Date: June 15, 2021

9. Vessel information (NOTE: if you are traveling aboard a National Oceanic and Atmospheric Administration vessel, skip this question):

Vessel name: M/V Imua
Vessel owner: Hawaii Resource Group/PM Tugs
Captain's name: Hans Bishop
IMO#: 8968193

Vessel ID#:1117720
Flag: USA
Vessel type: Cargo / Supply Vessel
Call sign: WDK2768
Embarkation port: Pearl Harbor
Last port vessel will have been at prior to this embarkation: Kewalo Basin
Length: 185'
Gross tonnage: 92 GRT
Total ballast water capacity volume (m3): 126997 gallons (fresh/potable water)
Total number of ballast water tanks on ship: 9
Total fuel capacity: 124,640
Total number of fuel tanks on ship: 8
Marine Sanitation Device: Yes
Type: II

Explain in detail how you will comply with the regulations regarding discharge in the Monument. Describe in detail. If applicable, attach schematics of the vessel's discharge and treatment systems: IMUA has adequate holding capacity to remain discharge free while transiting and working in the Monument Zone. IMUA has been approved to make several voyages for Fish and Wildlife Service through the monument in the last 18 months. IMUA is keel cooled, so there is no engine water overboard discharge. The crew on IMUA are extremely familiar with the rules and regulations regarding discharges in the Monument.

IMUA will not need to discharge or treat any discharge overboard while in the Monument.

Other fuel/hazardous materials to be carried on board and amounts: gasoline for small boats (500 gallons)

Provide proof of a National Oceanic and Atmospheric Administration (NOAA) Office of Law Enforcement-approved Vessel Monitoring System (VMS). Provide the name and contact information of the contractor responsible for installing the VMS system. Also describe VMS unit name and type: Thrane & Thrane TT-3026D installed by Oceantronics

VMS Email: IMUA@skyfile
Inmarsat ID#:881651443085

* Individuals MUST ENSURE that a type-approved VMS unit is installed and that its automatic position reports are being properly received by the NOAA OLE system prior to

the issuance of a permit. To make sure your VMS is properly configured for the NOAA OLE system, please contact NOAA OLE at (808) 725-6110 or (808) 725-6100.

*** PERMITS WILL NOT BE ISSUED TO INDIVIDUALS ENTERING THE MONUMENT VIA VESSEL UNTIL NOAA OLE HAS CONTACTED THE MONUMENT PERMIT COORDINATOR WITH A 'POSITIVE CHECK' READING.**

10. Tender information:

On what workboats (tenders) will personnel, gear and materials be transported within the Monument? List the number of tenders/skiffs aboard and specific types of motors: (2) two NOAA/PMNM 19' Safeboats with twin 90hp Honda motors.

Additional Information for Land Based Operations

11. Proposed movement of personnel, gear, materials, and, if applicable, samples:
NA

12. Room and board requirements on island: NA

13. Work space needs: NA

DID YOU INCLUDE THESE?

- ☒ Map(s) or GPS point(s) of Project Location(s), if applicable
- ☐ Funding Proposal(s)
- ☒ Funding and Award Documentation, if already received
- ☒ Documentation of Insurance, if already received
- ☐ Documentation of Inspections
- ☐ Documentation of all required Federal and State Permits or applications for permits

Pearl and Hermes Atoll Biosecurity Measures
PMNM-2021-001 (ONMS), PMNM-2021-016 and PMNM-2021-019

The following document outlines the mitigation steps ONMS cruise participants will follow to ensure adequate biosecurity measures are followed to mitigate the risk associated with accessing Manawai (Pearl and Hermes Atoll) for research activities defined in permits: PMNM-2021-001 Co-Trustee Managers Permit (and associate memo to file), PMNM-2021-016 and PMNM-2021-019.

Manawai is the sole known location of *Chondria tumulosa* and therefore provides the only option for conducting the management critical research outlined by these permitted activities. This research is essential for management to develop science-based protocols for preventing further spread and loss of resources.

The steps outlined below apply to research projects and activities involving *Chondria tumulosa* which fall outside of BMP 011 (Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment, Papahānaumokuākea Marine National Monument) and draft BMP XX (Best Management Practices for Activities at Pearl and Hermes Atoll). Draft BMP XX will be referred to as BMP PHA for the remainder of the document.

A [HACCP](#) analysis was undertaken to thoroughly assess steps and associated activities for the research activities below to ensure all steps had been evaluated.

Research Activities:	Supplemental Mitigation Steps:
SCUBA Surveys/Collections	Will follow all SOPs outlined in BMP 011 and BMP PHA pertaining to dive and sampling equipment. All disinfection procedures defined by BMP 011 will utilize bleach concentrations referenced in BMP PHA. Equipment, divers and small boat will be inspected daily and will be disinfected and thoroughly dried before returning to Honolulu
Water samples for nutrients and eDNA	Will follow all SOPs outlined in BMP 011 and BMP PHA regarding sampling equipment and laboratory disinfection. All disinfection procedures defined by BMP 011 will utilize bleach concentrations referenced in BMP PHA. Water samples will be stored in secondary containment aboard ship and all collections will be preserved in a biosecure manner (e.g. frozen or chemically preserved). Excess water from eDNA filtration will be disposed of overboard at PHA or in ships grey water tank which will be pumped once outside 50nm original boundaries.

<p>Algal samples for stable isotope and genetic analyses</p>	<p>Researchers will follow all SOPs outlined in BMP 011 and BMP PHA regarding disinfection of sampling equipment and laboratory spaces. All disinfection procedures defined by BMP 011 will utilize bleach concentrations referenced in BMP PHA. Algal samples will be double bagged in the field before being placed in tertiary (3 layers) containment in the small boat. Lab areas will have confinement trays to prevent water or algal fragment distribution and all samples will be stored in secondary containment aboard ship. All collections will be preserved in a biosecure manner (e.g. frozen or chemically preserved) and no live samples will leave PHA.</p>
<p>Shipboard tank-based PAM fluorometry and growth experiments</p>	<p>Researchers will follow all SOPs outlined in BMP 011 and BMP PHA regarding disinfection of collection equipment, laboratory spaces, and growth experiment equipment upon completion of experimentation. All disinfection procedures defined by BMP 011 will utilize bleach concentrations referenced in BMP PHA. Algal samples will be double bagged in the field before being placed in tertiary containment in the small boat. Algal samples will then be transferred to secure grow out containers (1 liter mason jars) for replicant growth experiments. All replicants will have secondary containment measures in place and will be secured on the ship. Additionally, all specimens will be frozen (to ensure no viable fragments) and disposed of before leaving PHA. PAM fluorometry experiments will take place within a controlled environment utilizing secondary containment for all samples. PAM Laboratory measurement spaces will be disinfected per BMP protocols.</p>
<p>Water Quality Sampling near and around Chondria</p>	<p>Researchers will follow all SOPs outlined in BMP 011 and BMP PHA regarding sampling equipment and laboratory disinfection. All disinfection procedures defined by BMP 011 will utilize bleach concentrations referenced in BMP PHA. Water samples will be stored in secondary containment aboard ship and all collections will be preserved in a biosecure manner (e.g. frozen or chemically preserved). Any excess water will be disposed of overboard at PHA or in ships grey water tanks which will be pumped once outside 50nm original boundaries.</p>

UAS Survey Flights	UAS operations will follow all requirements provided by ONMS and OMAO leadership. There are no known risks with these airborne activities. As a precaution, UAS and associated equipment will be wiped down with disinfection wipes, inspected and thoroughly dried before being stored for transit back to Honolulu. If UAS makes contact with water, it will be thoroughly cleaned and disposed of properly if deemed dysfunctional.
Ship Based Operations	The NOAA charter vessel <i>Imua</i> will not be anchoring and will be in constant motion for the duration it is offshore of PHA. Time at PHA is not expected to exceed 9 days. The vessel will have undergone a hull inspection prior to its departure to ensure below water surfaces have adequate anti-fouling coatings. The <i>Imua</i> has no ballast tanks. All deck spaces surrounding small boats storage, ship entry/egress areas, crane operation zones, dive equipment storage, lab spaces and associated areas will be disinfected per BMP protocols and washed down before departing PHA at required distances offshore.
Small Boat Usage	Both PMNM vessels utilized during this trip will be thoroughly disinfected per BMPs and will not be utilized at any location upon departing PHA. There is a possibility to recover an acoustic buoy on the transit back that would utilize the contract vessel's small boat, which would have not been in contact with the PHA environment.

Chondria Percent Cover Survey Sites

Percent Cover (%)

- ≤5
- ≤20
- ≤35
- ≤45
- ≤95

□ Long-term Monitoring Sites

▲ Depth Gradient Survey Sites

○ Snorkel Survey Sites



Esri, NASA, NGA, USGS, Esri, HERE, Garmin, METI/NASA, USGS, Maxar

Abundance and Distribution of *Chondria tumulosa*

Pearl and Hermes Atoll 2019

0 0.5 1 2 Miles
+ + + + +



**Northern PHR
Spur and Groove
PHR 4140**



***Chondria tumulosa* Depth Survey
Pearl and Hermes Atoll 2019**

Chondria Depth Survey Sites

Percent Cover (%)



* Depth in fsw are labeled next to each site

**West PHR
Forereef
PHR R33**



**East PHR
Spur and Groove
PHR 82**



**Southwest PHR
Forereef
PHR 80**



Chondria tumulosa

Percent Cover (%)

- ≤5
- ≤20
- ≤35
- ≤45
- ≤95

- Long-term Monitoring Sites
- ▲ Depth Gradient Survey Sites



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Priority *Chondria tumulosa* Survey Sites 2021

Pearl and Hermes Atoll, NWHI

0 0.75 1.5 3 Miles



Long-term Monitoring Sites for Coral Health

Site	Chondria_%	Lat	Long	Depth(fsw)	Reef_Zone	Pins
PHR_31	1.95	27.775752	-175.973484	25	Backreef	NO
PHR_32	0	27.772788	-175.939602	25	Backreef	YES
PHR_33	0	27.78547	-175.82375	40	Forereef	YES
PHR_65	0	27.94305998	-175.72381	66	Forereef	NO
PHR_73	0	27.90783	-175.72118	62	Forereef	NO
PHR_80	28.3	27.78992	-175.99815	40	Forereef	NO
PHR_R33	1.75	27.91051667	-175.9046667	38	Forereef	YES
PHR_R39	0	27.940767	-175.86175	35	Forereef	YES
PHR_R42	0	27.753133	-175.948767	48	Forereef	YES
PHR_tc26	70.7	27.9578	-175.80208	5	Backreef	YES

****Please see *Chondria tumulosa* data excel sheet for field notes about each long-term site.

Email kpascoe@hawaii.edu or johnhr@hawaii.edu for questions

Depth Survey Sites in 2019

Site	Lat	Long	Depth_fsw	Chondria_%
PHR_80	27.79004507	-175.9989996	56	60
PHR_80	27.79019041	-175.9995386	45	30
PHR_80	27.79028672	-176.000145	50	70
PHR_80	27.79041848	-176.0005664	57	1
PHR_80	27.79057112	-176.0010409	41	1
PHR_80	27.79066558	-176.0013012	69	5
PHR_80	27.79092475	-176.0019424	64	30
PHR_80	27.79134829	-176.0030582	59	0
PHR_80	27.79153554	-176.0036547	71	0
PHR_80	27.79176688	-176.0043603	80	0
PHR_R44	27.91209639	-175.9070383	81	0
PHR_R44	27.91182113	-175.9069445	70	0
PHR_R44	27.91143849	-175.9067535	62	0
PHR_R44	27.91055487	-175.9063072	50	0
PHR_R44	27.90983998	-175.9060043	40	35
PHR_R44	27.90939557	-175.9058457	30	40
PHR_R44	27.90896785	-175.9056208	25	75
PHR_R44	27.90850919	-175.905293	20	95
PHR_R44	27.90820476	-175.9052493	10	65
PHR_82	27.8515384	-175.7386908	60	0
PHR_82	27.85148618	-175.7389153	50	1
PHR_82	27.85154628	-175.7393205	40	35
PHR_82	27.85153178	-175.7402111	38	40
PHR_82	27.85146656	-175.7409064	37	30
PHR_82	27.8513871	-175.7414596	32	15
PHR_82	27.8513177	-175.7418164	25	20
PHR_82	27.85125375	-175.7421811	20	15
PHR_4140	27.96611667	-175.774446	68	1
PHR_4140	27.96578147	-175.774356	64	15
PHR_4140	27.96546858	-175.7742744	60	30
PHR_4140	27.96521695	-175.7742778	52	5
PHR_4140	27.9648344	-175.7742014	48	10
PHR_4140	27.96451195	-175.7740865	41	45
PHR_4140	27.96387342	-175.7740525	35	60
PHR_4140	27.96353538	-175.7739496	30	20
PHR_4140	27.96329582	-175.7739113	25	5
PHR_4140	27.96311201	-175.773869	21	1
PHR_4140	27.96276198	-175.7739391	19	0

Proposed Sites

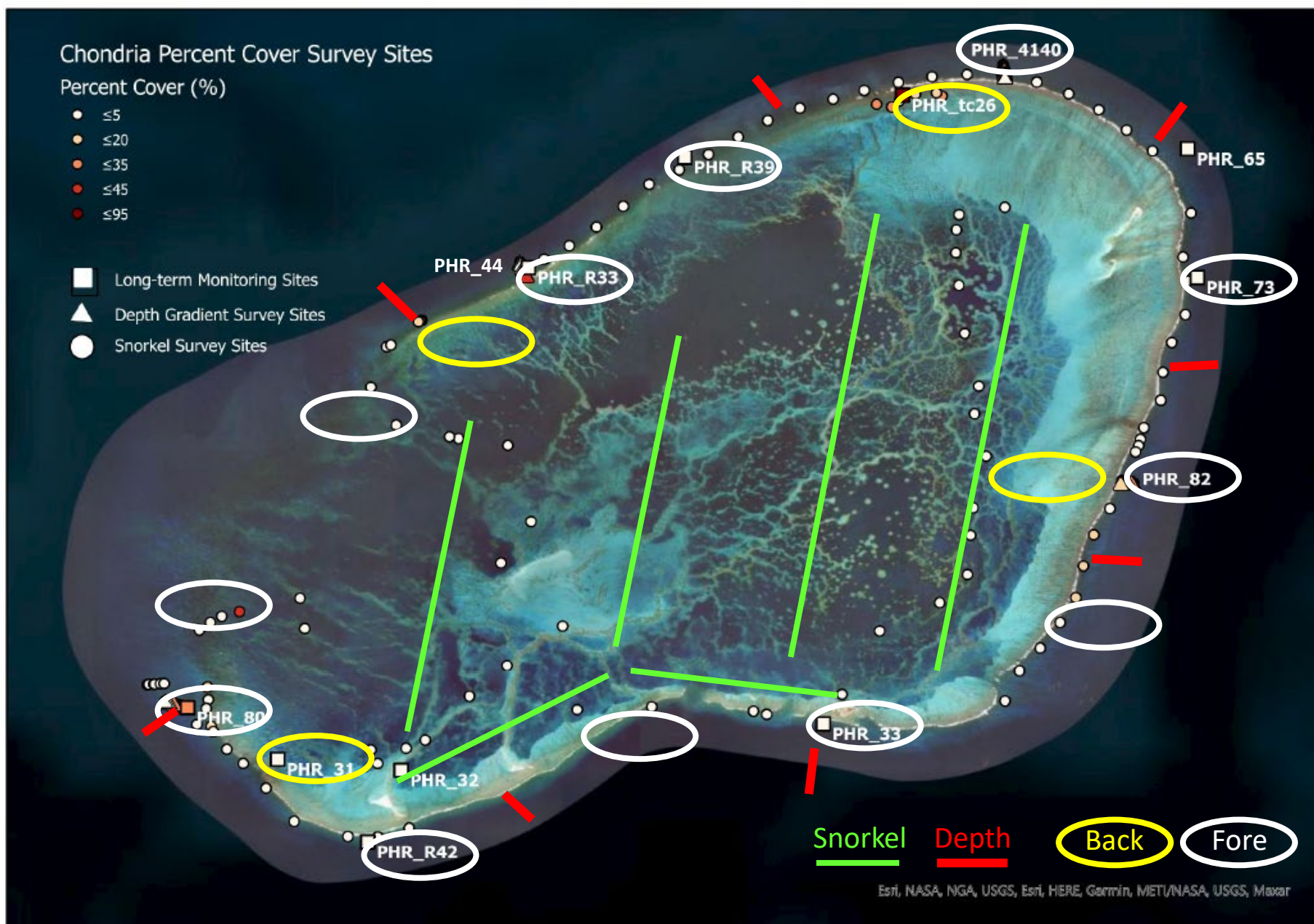
July 2021 Cruise - Manawai

FFS – Shake down dives

- Rapture Reef
 - Collect algae and images of algal/coral successional patterns
 - Images for MEGA lab

Manawai – 8 days of diving @ 3 dives/day

- Forereef (n=12 dives)
 - Dives spread around the perimeter
 - 30-60 ft depth target
 - Use permanent coral sites when available
- Backreef (n=4 dives)
 - 2 permanent backreef sites
 - 2 new sites to the West and East
- Depth gradient dives (n=8)
 - ~70-80 ft start to 10 ft depths
- Lagoon (Snorkel)
 - Visual transects snorkeling to ~20 ft
 - Free dives to assess %cover



Placement is approximate

Abundance and Distribution of *Chondria tumulosa*

Pearl and Hermes Atoll 2019

0 0.5 1 2 Miles

